A Note on the Proposal of an Immunochemical System of Reference and Nomenclature for the Major Soybean Globulins

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The need for a common reference system and nomenclature of soybean globulins has been recognized recently by the formation of a Soybean Protein Nomenclature Committee under sponsorship of the Oilseeds Division, American Association of Cereal Chemists. It is the purpose of this note to present to the consideration of the Committee and other interested investigators a new nomenclature for the major soybean globulins based on an immunochemical system of reference.

In a series of investigations from this laboratory (1-9), the conclusion has been reached that four major soybean globulins can be differentiated immunochemically. It is proposed that these immunochemically homogeneous proteins be called glycinin (Gl), and alpha-, beta-, and gamma-conglycinins (ConGl). These proteins have been isolated by fractionation procedures based on Bio-Gel A-1.5m and Sephadex G-100 gel filtration, and DEAE-Sephadex ionic-strength chromatography.

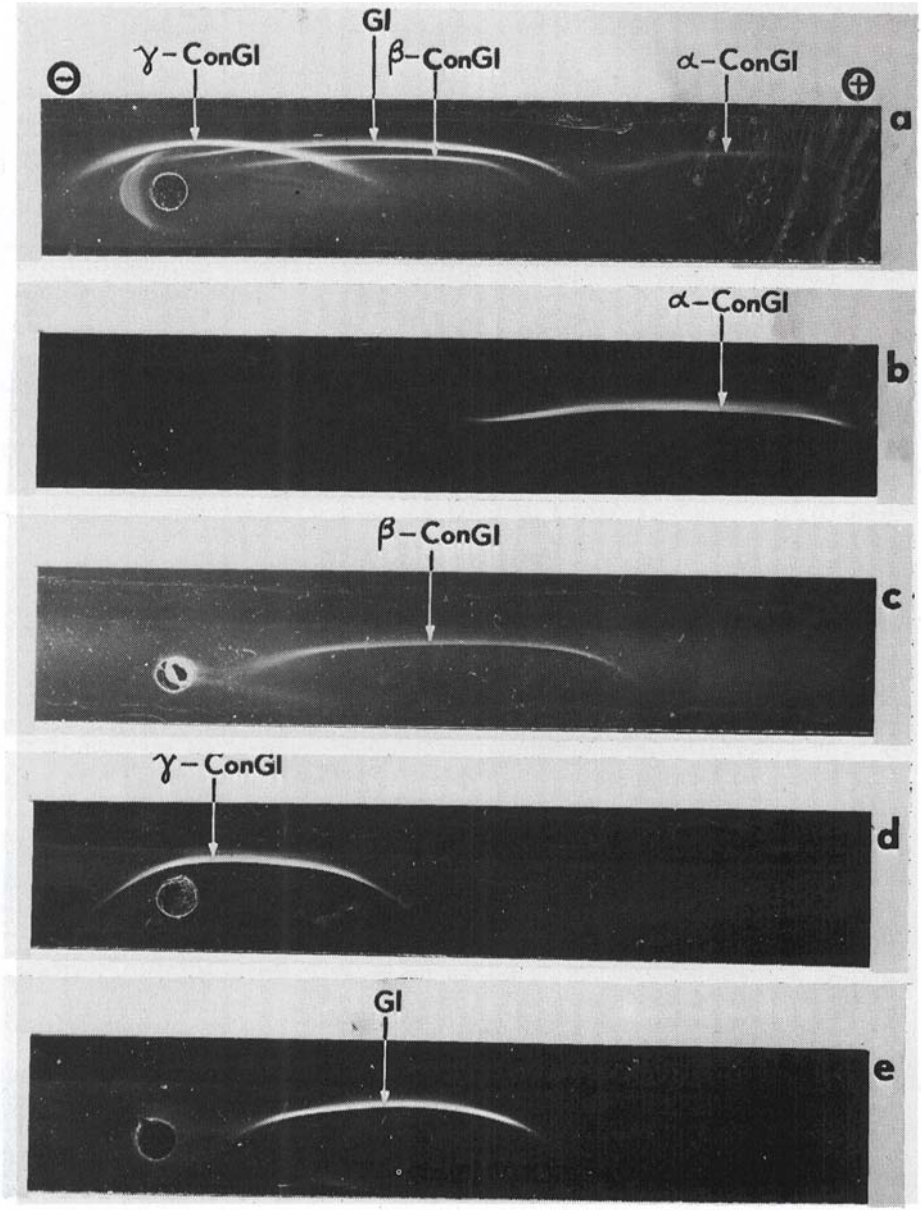

Fig. 1. Immunoelectrophoresis in agar gel patterns of (a) four major reserve proteins of soybean seeds, (b) alpha-conglycinin, (c) beta-conglycinin, (d) gamma-conglycinin, and (e) glycinin. A polyvalent pooled antisoybean water extract serum was used for the development of the immunoprecipitin bands. Immunoelectrophoresis in agar gel was carried out by the general procedure described in Grabar and Williams (10) as modified by Scheidegger (11). The gel medium consists of 1% Ionagar No. 2 (Oxoid) in pH 8.8 buffer, tris-barbital-sodium barbital, 0.05 ionic strength (Gelman). Electrophoresis was carried out for 2.5 hr. with a current of 5 ma. per microscope slide. Staining of the precipitin arcs was done with Ponceau S as described by Uriel (12).

The antisera used for their identification were (a) several polyvalent antisoybean water extract sera, (b) several polyvalent antisoybean globulin sera, (c) a monospecific antiglycinin serum, and (d) a monospecific anti-gamma-conglycinin serum. Figure 1 shows typical immunoelectrophoresis patterns in agar gel of glycinin, alpha-conglycinin, beta-conglycinin, and gamma-conglycinin, all developed with a pooled polyvalent antisoybean water extract serum.

Glycinin as used in the proposed nomenclature is identical with the major component (11S) of soybean globulins and should be distinguished from the old term "glycinin" proposed by Osborne and Campbell (13), which represents a heterogeneous mixture of proteins. Alpha-conglycinin is the 2S globulin found as a contaminant in the crude 7S protein preparation of Koshiyama (14) and separated from the latter component by Sephadex G-100 filtration. Alpha-conglycinin is immunochemically different from soybean trypsin inhibitor (SBTIA-2). The 7S component isolated by the method of Koshiyama (14) gives an immunoprecipitin band identical with that of gamma-conglycinin. Beta-conglycinin is the major component in the crude 7S protein prepared by the procedure of Roberts and Briggs (15). High-molecular-weight globulins, probably exhibiting 15S and higher sedimentation coefficients, are polymers or copolymers of glycinin, beta-conglycinin, and gamma-conglycinin. These proteins can be separated from the unpolymerized globulins by Bio-Gel A-1.5m filtration. The subunit composition of glycinin, alpha-conglycinin, beta- conglycinin, and gamma-conglycinin as examined by disc electrophoresis in dissociating media, is different. Thus, these proteins represent individual molecular species.

The suggested nomenclature based on immunoelectrophoresis may be a helpful reference system for identification of major soybean globulin components.

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[Received July 25, 1968. Accepted Sept. 30, 1968]